

Dokhaven sewage treatment plant – a large upgrade and extension



The Dokhaven facility, an underground water treatment plant in the middle of Rotterdam, is built in a former harbor. The water is treated at a pump station situated 14 meters under the river; during this unique process, it pumps up the treated water so that it flows to the river.

The Dokhaven sewage treatment plant treats a large segment of The Netherlands' wastewater – about 122,000,000 liters per day. In addition to modernizing the old ABB control system, Dokhaven also had to satisfy stricter nitrogen discharge limits. When it comes to well-controlled reliable processing, meeting stringent environmental standards means meeting stringent demands.

EVOLUTION SCHEME	Operator stations	Controllers	I/O Modules
Industrial IT	3 Process Portal		S800 I/O, 5000 channels
Advant		13 Advant Controller 450 MasterBus 300 network	
Master	3 MasterView	11 MasterPiece 2x0 45 MasterPiece 100 MasterBus 200 network	S100 I/O, 6000 channels MP100 I/O, 5000 channels

Upgrading Reused Outphased





Since the old controllers had reached the limits of their capacity, new ones had to be installed.



The I/O units of the old MasterPiece 100 controller were replaced with the S800 I/O.



Mr. Ing. Remko van Duin, process coordinator at WSHD Dokhaven, in front of a map of the Dokhaven plant.

Sequential upgrade with no production downtime

In order to meet the new environmental standards and avoid substantial penalties for non-compliance, Dokhaven needed to expand and upgrade its entire control system. First, new application software was required. Second, since the old controllers had reached the limits of their capacity, new ones had to be installed. New operator stations were also required to make room for more display pictures. Furthermore, to facilitate a modern communication platform, a major portion of the cable system had to be replaced. Both this far-reaching expansion and upgrade were carried out in sequential steps during full operation – no process downtime was allowed.

The story of a complex installation: Thorough preparations

In the first step, the old Master Bus 200 was replaced with the new Master Bus 300; in other words, the new TCP/IP cabling was installed but not connected to anything at this stage.

The new Process Portal operator stations were placed in the control room together with the old stations, but without any connection to the process. Now, this side of the new cabling could be connected to the new stations.

The I/O units of the old MasterPiece 100 controllers – 45 in all – were prepared for connection to the new S800 I/O.

The AC 450 controllers, which had already been programmed and tested, were placed at their designated positions in the plant, one in each process area.

Rapid expansion and upgrade

Up to this point, the installation had been prepared without any downtime. The actual expansion and upgrade were carried out over the course of nine days, one day at a time, with one- or two-week intervals in between. The downtime per controller was maximized to 12 hours, during which the process was manually controlled. This arrangement was necessary since no process area could be shut down, and no downtime in the continual processing was allowed.

When the actual upgrade took place, the old MP2x0 controllers were disconnected and replaced with the new AC 450 controllers, while the S800 I/O unit replaced the MP 100 I/O. During this step, the Process Portal stations were also put into operation.



Mr. Ing Remko van Duin, process coordinator at WSHD Dokhaven, with the Process Portal operator stations in the control room. Van Duin is satisfied with ABB's work.

From old to new operator stations

Until the complete upgrade of the 11 process controls was carried out, both the old and new operator stations were working separately in order to control different process areas. This meant that there was an instant exchange of operator stations for every process area. Of course, the control room personnel had been thoroughly prepared to deal with this situation and to keep track of which process area was controlled by which controller.

Ready to meet the future

All upgrades were carried out within the maximum downtime allowed – 12 hours per node. The first upgrade took 12 hours and the last one took 7 hours. This initial upgrade was carried out in 2000, with an early version of Process Portal and a one-to-one mapping of display pictures from the old operator stations. A final step was taken in 2003, when the operator stations were upgraded to the latest version of Process Portal. Since then, engineers and operators have been creating new process displays to improve supervision of the process.

“Without any problems”

Mr. Ing. R. van Duin, process coordinator at WSHD Dokhaven – Rotterdam – NL, comments: “Thanks to well-prepared, detailed, customer-required Factory Acceptance Tests (FAT), performed before starting the actual upgrade, Dokhaven was satisfied that all upgrades were carried out without any problems in the wastewater treatment process. The new controllers and Process Portal stations function properly, and since the upgrade Dokhaven has carried out several projects using the new ABB automation environment.”

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